

***HUMBOLDT ROAD BURN DUMP  
CONFIRMATION SAMPLING REPORT  
CHICO REDEVELOPMENT AGENCY PARCELS  
LOCATED WEST OF BRUCE ROAD***

***Assessor's Parcel Numbers:***

***002-180-087***

***002-180-088***

***002-180-089***

***002-180-095***

***Prepared for:***

***Chico Redevelopment Agency  
411 Main Street  
Chico, California 95927***

***Prepared by:***

***VECTOR ENGINEERING, INC.  
143E Spring Hill Drive  
Grass Valley, California 95945  
(530) 272-2448***

***Project No. 051601.00  
October 2005***



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**1.0 INTRODUCTION**

**1.1 Purpose of the Report**

The purpose of this report is to document and summarize the confirmation sampling activities and results conducted on the parcels controlled by the Chico Redevelopment Agency (RDA) located west of Bruce Road that are included in the Humboldt Road Burn Dump (HRBD) remediation project, located at the intersection of Humboldt Road and Bruce Road in Chico, California, as shown in Figure 1: *Site Location Map*. For the purposes of remediation and confirmation sampling, the RDA parcels at HRBD were divided into two separate areas, west of Bruce Road (WBR) and east of Bruce Road (EBR). The RDA parcels were divided into these two separate areas for several reasons: (1) the difference in the nature and volume of waste, (2) the difference in the underlying soils, and (3) the difference in the condition of the parcels after remediation is concluded. Concerning this difference, the WBR parcels controlled by the RDA contained a thin veneer of waste material over unconsolidated clayey gravel, the waste material at WBR does not contain elevated levels of constituents other than metals, and after remediation is completed, the WBR parcels will not contain any waste cells or monitoring systems. In contrast, the EBR parcels controlled by the RDA contained a large quantity of waste material overlying volcanic bedrock. Testing of waste material EBR during the Remedial Investigation suggested that elevated levels of dioxins may be present

in this area of the HRBD. After remediation is completed, the EBR parcels will contain the consolidation cell and several monitoring systems related to the cell.

For the purposes of confirmation sampling, the following two zones were identified for the WBR area:

- Zone 1: Includes all of the RDA parcels located west of Bruce Road. (APN 002-180-087, 002-180-088, 002-180-089, and 002-180-095).
- Zone 2W: The thin areas of exposed soil within the Public Right-of-Way along the west side of Bruce Road and the north side of Humboldt Road that are located between the edge of the right-of-way and the edge of pavement.

The confirmation activities described in this report were conducted in the area west of Bruce Road. A separate report will be issued for east of Bruce Road.

## **1.2 Project Description**

Investigation and remediation of the HRBD are being conducted under California Assembly Bill 2061 (AB 2061), with the Regional Water Quality Control Board, Central Valley Region (RWQCB) as the Administering Agency. In 2001 and 2002 the City of Chico completed remedial investigations, a baseline risk assessment, and a feasibility study for the HRBD. In June 2003, RWQCB issued Cleanup and Abatement Order No. R5-2003-0707 to the parties potentially responsible for the site. In response to the Cleanup and Abatement Order, the RDA submitted a Remedial Action Plan to the RWQCB in April 2004. The remedial design package was submitted to RWQCB in October 2004. The Remedial Action Plan and the remedial design package submitted by the RDA address the six parcels at HRBD controlled by the RDA. Appendix H of the October 2004 Remedial Design Report presents the details of the Confirmation Sampling Plan, which confirm that the

remediation activities achieve the cleanup goals set forth in the Remedial Action Plan.

The Contractor, Performance Excavators, Inc. of San Rafael, California, excavated the waste material from the WBR area and transferred the material to an engineered landfill in the EBR area. Prior to the excavation, confirmation sampling was conducted along the Zone 2W to determine what areas of the right-of-way, if any, required remediation. After excavation was completed, the Contractor conducted subsequent confirmation sampling of soil from the excavated areas of WBR. Vector Engineering, Inc. (Vector) observed the excavation and confirmation sampling after excavation was complete.

Excavation in the WBR area began on June 27, 2005 and was completed on July 29, 2005. Approximately 18,500 cubic yards of material was excavated from WBR, from an area encompassing approximately 240,000 square feet.

### **1.3 Confirmation Sampling Objectives**

Confirmation sampling was conducted prior to and after excavation to establish that the WBR area had been remediated appropriately, and that residual concentrations of site-related constituents did not exceed the risk-based remediation goals (RBRGs) established for solid media (soil, sediment, and waste) at the site.

The objectives of the confirmation sampling were to:

- Confirm that waste was removed from all areas of WBR;
- Use an iterative procedure to remediate and sample areas to achieve final acceptance;
- Collect and analyze samples using specific established requirements; and

- Document that residual concentrations of chemical of concern (COCs) were below the RBRGs in remediated areas.

The clean-up criteria for this project are:

- Verification that concentrations of site-related constituents in the confirmation samples are below the RBRGs, or
- Excavation to bedrock.

Since bedrock does not exist at WBR, the clean-up criteria used for this report are the RBRGs. If sample concentrations exceeded the RBRGs, further remediation was conducted until the concentrations were below the RBRGs. The table below summarizes the RBRGs that were reported in the Feasibility Study Report (EMKO and Brown and Caldwell, 2002) and used as the clean-up criteria for WBR.

**RBRGs FOR COCs**

<b>COCs</b>	<b>RBRG (mg/kg)</b>
Lead	224
Antimony	31
Arsenic	6

During the Remedial Investigation, lead was the most frequently detected site-related constituent, and was the constituent detected at the highest concentrations relative to its RBRG. Because lead is considered the primary indicator of the presence of waste at the HRBD, all confirmation samples were analyzed for lead. During confirmation sampling, the analysis frequency for antimony and arsenic were matched with the frequency at which these constituents exceeded the RBRGs in the samples collected during the Remedial Investigation.

#### 1.4 Personnel / Role

The following table lists the names and functions of all project participants.

ORGANIZATION/NAME	FUNCTION
Chico Redevelopment Agency – John Vanderhaar	Owner, Senior Construction Engineer/Inspector
EMKO Environmental, Inc. – Dr. Andrew Kopania	Owners' Representative, Regulatory Liaison
Brown and Caldwell – Linda Roe and Tom Fojut, P.E.	Design Engineer
Performance Excavators Principal: Mark Warner	Contractor
CSS Environmental Services – Terrance Carter	Confirmation Sampling – Subcontractor of Performance Excavators
Vector Engineering, Inc. – Bryan Fritzler, P.E. and Vince Suryasasmita, P.E.	Construction Quality Assurance Consultant

#### 1.5 Controlling Documents

The pertinent documents regarding confirmation sampling of the HRBD are:

- Brown and Caldwell: *Appendix H, Confirmation Sampling Plan, Humboldt Road Burn Dump, Chico, California, 2004.*
- *Revised - Sampling and Analysis Plan (SAP) – City of Chico – Humboldt Road Disposal Site and Remediation Project, Chico, CA,* prepared by CSS Environmental Services, Inc. for Performance Excavators, Inc. dated May 29, 2005. This document is attached in Appendix A.



## **2.0 SCOPE OF WORK - CQA CONFIRMATION SAMPLING**

Vector implemented the following construction quality assurance (CQA) activities during the confirmation sampling, as required in the Confirmation Sampling Plan:

- Visual observation of the clean-up;
- Random selection of the sample locations for each zone;
- Observation of the Contractor's sampling activities for compliance with the SAP;
- Review of the analytical test results and chain of custody of the samples;
- Review of field Quality Control samples and CQA conformance samples; and
- Preparation of a final report documenting the results of the confirmation sampling.

### **2.1 Visual Observation of Clean-Up**

Vector personnel were on site to observe and document the clean-up activities conducted by the Contractor, including excavation of impacted soil and waste, transfer of impacted material to the engineered landfill, confirmation sampling, and QA/QC sampling. Upon completion of excavation, the Contractor, Vector, and Brown and Caldwell performed a walk-through of the completed excavation to visually confirm that the excavation had been completed as per the project specifications. Based on their visual observations, all parties in the walk-through agreed that the excavation had in fact fulfilled these specifications. This walk-through is discussed further in Section 3 of this report.

### **2.2 Random Sampling Procedure**

A random sample generating procedure (Super Cool Software Output Version 1.04) was used during the confirmation sampling of the HRBD site in order to select random sample sites at both zones.

The random sampling program employs statistically random strategies that use a grid to select unbiased sampling points, as well as statistical tools to evaluate the results. These sampling strategies provide a 95% level of accuracy in identifying the absence or presence of “hot spots” in remediated areas. Grid intervals are calculated based on the length of the area to be included in the grid, and the size of the area to be remediated.

A 25-foot grid interval was selected for WBR. The individual nodes are identified by the Cartesian coordinate system (X-Y) with the origin located southwest of the project site, as shown in Figure 2: *Grid and Nodes for Possible Confirmation Sampling*. The grid was established by a surveyor prior to sampling and was maintained throughout remediation.

In Zone 1 there are a total of 384 nodes. In Zone 2W there are a total of 76 nodes. Based on the statistical procedures used for the confirmation sampling, 25 percent of the total number of nodes were selected as sampling locations. Therefore, Zone 1 contains 96 confirmation sampling points and Zone 2W contains 19 confirmation sampling points, for a total of 115 confirmation sampling points in WBR. Results of random node selection of Zone 1 and Zone 2W are tabulated in Table 1: *Random Sample Locations for West of Bruce Road* and graphically presented in Figure 3: *Sample Locations for West of Bruce Road*.

Each of the 115 sample nodes established at WBR were analyzed for lead, the primary site indicator. Based on the frequency of arsenic detections above the RBRG during the Remedial Investigation, 24 of the 115 selected sample nodes were analyzed for arsenic, all of which were selected from Zone 1. Based on the frequency of antimony detections above the RBRG during the Remedial Investigation, 9 of the 115 selected sample nodes were analyzed for antimony, all of which were also selected from Zone 1. Elevated levels of dioxins were not detected

at WBR during the Remedial Investigation, so confirmation sampling for dioxins was not conducted at WBR.

### **2.3    *Observation of Sampling***

Sampling was performed by CSS Environmental Services, Inc. (CSS) of San Rafael, California. Vector's personnel were present to observe the sampling procedures employed, to ensure that sampling was performed as outlined in SAP. Vector's personnel observed that samples were taken at the appropriate sample locations using a sealed disposable polystyrene sterile scoop, were placed into a pre-cleaned sealed container (4-oz glass jar) supplied by the analytical testing laboratory, and were then immediately placed into a chilled container for shipment. Because a new sealed disposable polystyrene sterile scoop was used for each sample location, the need for decontamination procedures between each sampling was eliminated. Additionally, Vector's personnel reviewed the chain-of-custody records, sample labeling, and packaging for shipment. Copies of the chain-of-custody are presented in Appendix B. Based on its observation of the sampling activities, Vector confirmed that the samplings were performed in general conformance with the approved SAP.

### **2.4    *Review of Results***

Vector reviewed the results of the confirmation sampling and testing activities to verify that the randomly selected sample nodes within the WBR area had been sampled and analyzed. Results of our review are discussed in detail in Section 3 of this report.

### **2.5    *Field Quality Control Samples***

As required by the SAP, to produce data of known quality that satisfy the standard methods for analysis, the laboratory crushed and homogenized each sample prior analysis. To ensure that the laboratory had properly prepared the samples, selected homogenized samples were split and tested for quality assurance/quality control

(QA/QC). QA/QC samples consisted of matrix spikes/matrix spike duplicates (MS/MSD) and field duplicates. Results of MS/MSD are included in Appendix B and results of field duplicates are presented in Appendix C. Based on the data presented, the QA/QC procedures that were followed were in compliance with the approved SAP.

Additionally, as required by the Confirmation Sampling Plan, after homogenizing the samples, the laboratory sent one sample from West of Bruce Road to a laboratory specified by the CQA Consultant. Duplicate of sample X23Y6 was sent to Curtis and Tompkins Analytical Laboratories and tested for lead, antimony, and arsenic. Test results are presented in Appendix C.

### **3.0 DISCUSSION OF SAMPLING AND TEST RESULTS**

Sampling of Zone 2W was performed prior to the excavation activities. Nineteen samples were taken from this area on May 26, 2005. Results of this sampling are tabulated in Table 2: *Summary of Confirmation Sample Results for Zone 2W*. As shown in this table, 5 of the 19 samples indicated a higher lead concentration than the allowable value (224 mg/kg).

As specified in the Confirmation Sampling Plan, additional samples (step-out samples) were collected from four nodes adjacent to the sampling point in order to define the extent of the impacted area that needed to be excavated. Since Zone 2W is a thin strip area bounded by the edge of pavement and Zone 1 excavation, such samples were only taken in the Zone 2 W area, and excavation was performed through the edge of pavement and Zone 1. Results of the re-testing of the original point and the subsequent step-out samples are also presented in Table 2. As shown in this table, all sample locations indicated values below the RBRGs. Therefore, sampling in Zone 2W is deemed completed.

Upon completion of the initial excavation in Zone 1, the first round of sampling was performed on July 11, 12, and 13 of 2005. However, due to the overly wet nature of the soils (caused by the large amount of dust-control water required for compliance with the air permit), the absence of residual waste or burn ash, which would indicate that the excavation had been completed, could not be readily confirmed by visual observation. The first round of sampling indicated that 46 of the 94 samples collected had values that exceeded the allowable limits. Sampling locations and results (pass/fail) are shown in Figure 4: *Zone 1 West of Bruce Road First Round Sampling Locations and Results*.

As shown in Figure 4, the contaminated areas were scattered throughout the site. It therefore became impractical to follow the step-out sampling procedure that had



originally been planned in order to determine the extent of excavation. Re-excavation for the entire area was therefore performed, along with the re-sampling of sampling points that had previously exceeded the RBRGs.

Upon re-excavation and re-sampling of sample location X6Y20, the lead concentration in this location was still exceeding the RBRG, therefore step-out samples were collected from the four corners adjacent to X6Y20. Test results of the four stepout samples indicated values below the RBRGs. Therefore, only the grid area corresponding to node X6Y20 was re-excavated.

During sampling events on July 12, July 27, and August 4, 2005, Ms. Karen Clementsen of California Regional Water Quality Control Board (RWQCB) Central Valley Region also took several split samples in the field from the contractor's samples. Result of the last sampling event (August 5, 2005) from sample X6Y20 indicated that the lead concentration in the RWQCB split sample from this location had a lead concentration of 260 mg/kg, which exceeded the RBRG of 220 mg/kg. However, the Contractor's result from the same sample was 150 mg/kg, which is below the RBRG. Since repeated excavation had already been performed at X6Y20, along with the non-homogenized split sampling in the field, the RWQCB concurred that the average between the contractor's sample and the RWQCB split sample should be used for this location. The average concentration of the contractor's sample and the RWQCB split sample is 215 mg/kg, which is below the RBRG.

Results for all samples collected in Zone 1, including field duplicate, RWQCB samples, and CQA sample, which determine compliance with the project specifications, are summarized in Table 3: *Summary of Confirmation Sample Results for Zone 1 (West of Bruce Road)*.

Test results for each sample node in West of Bruce Road, including Zone 2W, are presented in Appendix 3. Based on the test results presented in this table, all sampling locations were below the RBRGs. Therefore, Zone 1 sampling is deemed completed.

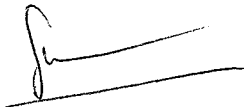
A final walk-through was performed by a representative of Brown and Caldwell (Linda Roe) and Vector's certifying engineer (Vince Suryasmita, P.E.) on August 10, 2005. To provide superior conditions for visual observation, the area was allowed to dry prior to the walk-through. Based on their visual observations, both parties in the walk-through agreed that the excavation had been completed as per the project specifications. No residual waste or burn ash were visible on the four parcels constituting Zone 1. In addition, no residual waste or burn ash were visible along the Bruce Road right-of-way and the Humboldt Road right-of-way in Zone 2W, or extending under the pavement.

#### **4.0 CONCLUSIONS**

Based on Vector's (1) observation upon completion of excavation, (2) observation of sampling procedures during sampling, (3) observation of the procedures employed during re-excavation and subsequent re-sampling, observation of the QA/QC procedures employed, and (4) analysis of the results as presented in this report, it is Vector's professional opinion that the Confirmation Sampling Plan in West of Bruce Road of the Humboldt Road Burn Dump was implemented in accordance with the SAP and RBRGs for this project.

This report was prepared in accordance with generally accepted engineering practices applicable at the time the report was prepared. Vector makes no other warranties, either express or implied, as to the professional advice provided under the terms of this agreement, and as described in this report.

#### **VECTOR ENGINEERING, INC.**



Vince Suryasasmita, P.E. No. C49773  
Certifying Engineer

